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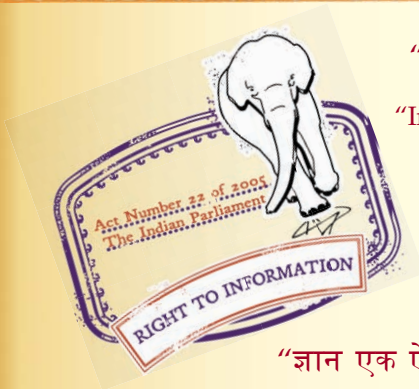
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Jawaharlal Nehru

“Step Out From the Old to the New”

IS 5051-3-1 (1985): Relays for electronic and telecommunication equipment : Part 3 - Armature relays, nonsealed, Section 1: Type RA 1 [LITD 3: Electromechanical Components and Mechanical Structures for Electronic Equipment]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS : 5051 (Part 3 / Sec 1) - 1985

(Reaffirmed 2002)

Indian Standard

**SPECIFICATION FOR
RELAYS FOR ELECTRONICS AND
TELECOMMUNICATION EQUIPMENT**

PART 3 ARMATURE RELAYS, NON-SEALED

Section 1 Type RA 1

UDC 621'318'56'043 : 621'38/'39'038



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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR RELAYS FOR ELECTRONICS AND TELECOMMUNICATION EQUIPMENT

PART 3 ARMATURE RELAYS, NON-SEALED

Section 1 Type RA 1

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Indian Standard

SPECIFICATION FOR RELAYS FOR ELECTRONICS AND TELECOMMUNICATION EQUIPMENT

PART 3 ARMATURE RELAYS, NON- SEALED

Section 1 Type RA 1

0. FOREWORD

0.1 This Indian Standard (Part 3 / Sec 1) was adopted by the Indian Standards Institution on 24 May 1985, after the draft finalized by the Electromechanical Components for Electronic Equipment Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 This standard (Part 3 / Sec 1) covers detailed requirements applicable to a type of non-sealed armature relays. The general requirements and methods of test are specified in Part 1 of this standard.

0.3 While preparing this standard, considerable assistance has been derived from JSS 50711-1975 Detail specification for relays, armature, other than hermetically sealed, issued by the Directorate of Standardization, Ministry of Defence, New Delhi.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 3 / Sec 1) covers detailed requirements for non-sealed 1, 2 and 3 PDT armature relays with dc operated coil with 5A (ac / dc) contact rating.

2. OUTLINE AND DIMENSIONS — See Fig. 1 to 3.

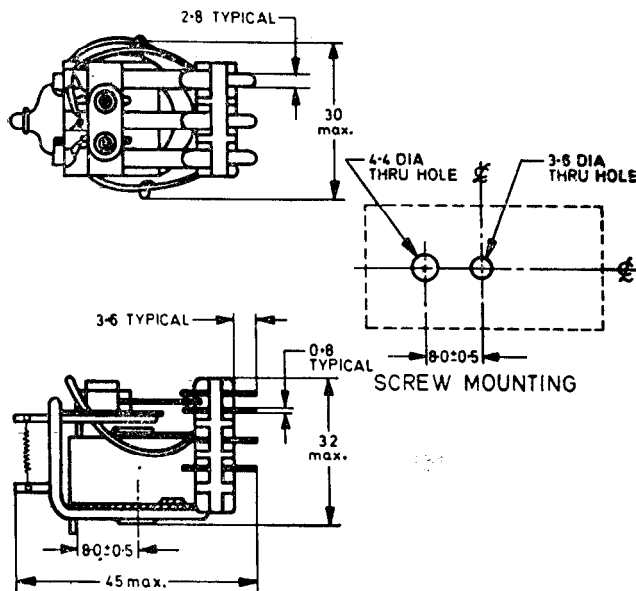
3. CONTACT RATING — 5 A (resistive).

*Rules for rounding off numerical values (revised).

4. CHARACTERISTICS

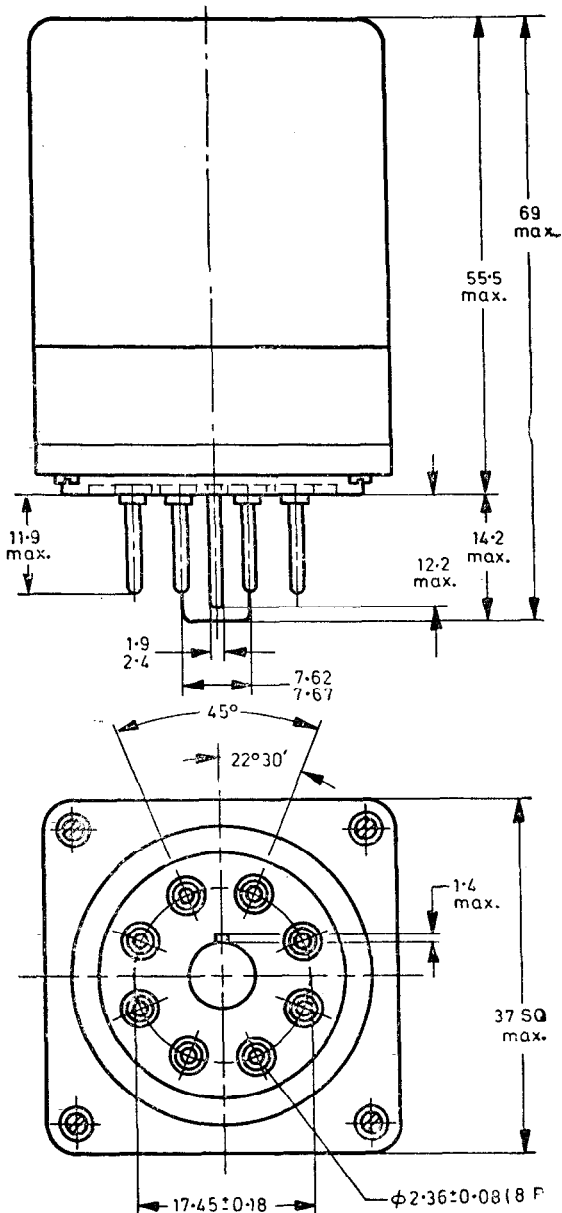
- | | |
|----------------------------------|---|
| a) Climatic category | 40/70/21 |
| b) Acceleration (steady state) | 170 m/s ² |
| c) Vibration | 10-55 Hz, duration 10 h, displacement amplitude — 0.75 mm,
Acceleration amplitude — 100 m/s ² |
| d) Impact (shock) | Peak acceleration — 800 m/s ²
Duration — 18 ms |
| e) Technical data | See Table 1 |

TABLE 1 TECHNICAL DATA		OVER THE TEMPERATURE RANGE (-40 to +70°C)	
COIL RESISTANCE (± 10 percent) ohms	RATED COIL VOLTAGE dc	Pickup Voltage dc, Max	Drop Out Voltage dc, Min
30	6	5	Within 5 to 50 percent of the rated coil voltage or 0.6 volt whichever is greater
150	12	9.5	
390	18	14.5	
500	26.5	18	
2 250	48	40	
10 000	110	90	



NOTE — Contact form C.
All dimensions in millimetres.

FIG. 1 SCREW MOUNT



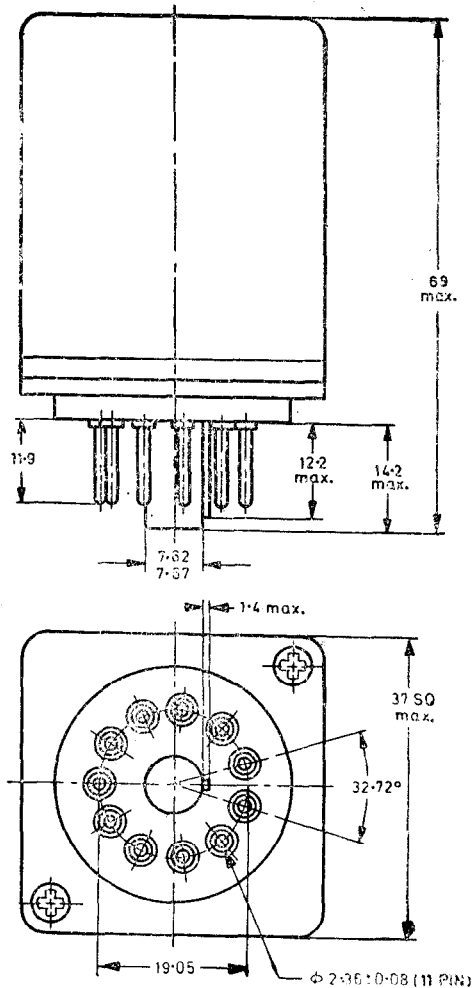
NOTE — Contact from C.
All dimensions in millimetres.

FIG. 2 PLUG-IN-TYPE (8 PIN)

5. TEST SCHEDULE

5.1 The schedule of the type tests, acceptance test and routine tests for the requirements given in 5 shall be as given in IS : 5051 (Part 1)-1982*.

6. TEST REQUIREMENTS — See Table 2.



All dimensions in millimetres.

FIG. 3 PLUG-IN-TYPE (11 PIN)

*Specification for relays for electronics and telecommunication equipment :
Part 1 General requirements and tests (first revision).

TABLE 2 TEST REQUIREMENTS
(Clause 6)

Sl. No.	TEST	CLAUSe REF IN IS : 5051 (Part 1)- 1982*	TEST CONDITIONS	REQUIREMENTS																		
(1)	(2)	(3)	(4)	(5)																		
(i) <i>Group O</i>																						
(a)	Visual examination	5 and 7.4.1	—	The condition, workmanship and finish shall be satisfactory. Markings shall be legible. The dimensions and materials shall be as specified																		
b)	Dimensions (outline)	7.4.2	—																			
c)	Dimensions (detail and materials)	7.4.3	—																			
d)	Coil resistance	7.5	Test current as small as practicable, uninterrupted voltage for 5 s	See Table 1																		
e)	Static contact resistance (or voltage drop)	7.6	<table><tr><th>Contact Rating A</th><th>Load Conditions</th></tr><tr><td>$2 < i \leq 10$</td><td>Rated current at 6 or 28V dc or ac peak</td></tr><tr><td>$i \leq 2$</td><td>100 ± 5 mA at 28 V dc or ac peak</td></tr><tr><td>Minimum current</td><td></td></tr><tr><td>0.1</td><td>10 mA (Max) at 30 mV (Max) open circuit voltage (dc or ac peak)</td></tr></table>	Contact Rating A	Load Conditions	$2 < i \leq 10$	Rated current at 6 or 28V dc or ac peak	$i \leq 2$	100 ± 5 mA at 28 V dc or ac peak	Minimum current		0.1	10 mA (Max) at 30 mV (Max) open circuit voltage (dc or ac peak)	<table><tr><th>Before Life Test</th><th>During and After Life Test</th></tr><tr><td>100 mV 0.05 ohm</td><td>200 mV 0.10</td></tr><tr><td>0.05 ohm</td><td>Level 1, 2 ohm Level 2, 3 ohm</td></tr><tr><td>0.05 ohm</td><td>0.15 ohm</td></tr></table>	Before Life Test	During and After Life Test	100 mV 0.05 ohm	200 mV 0.10	0.05 ohm	Level 1, 2 ohm Level 2, 3 ohm	0.05 ohm	0.15 ohm
Contact Rating A	Load Conditions																					
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Before Life Test	During and After Life Test																					
100 mV 0.05 ohm	200 mV 0.10																					
0.05 ohm	Level 1, 2 ohm Level 2, 3 ohm																					
0.05 ohm	0.15 ohm																					
f)	Pickup and drop out voltage	7.7	—	See Table 1																		
g)	Contact bounce	7.8	—	3 ms, Max																		

*Specification for relays for electronics and telecommunication equipment: Part 1 General requirements and tests (first revision).

TABLE 2 TEST REQUIREMENTS — <i>Contd</i>				
SL No.	TEST	CLAUSe REF IN IS : 5051 (Part 1) - 1982*	TEST CONDITIONS	REQUIREMENTS
(1)	(2)	(3)	(4)	(5)
h)	Voltage proof	7.9	Point of application	
			1) Between case, frame or enclosure and between open contacts in the energized and unenergized position	500 V (rms) at sea level No break down or flashover shall occur and leakage current shall not exceed 1 mA
			2) Between case, frame or enclosure and coil	
			3) Between all contacts and coil	
			4) Between open contacts in the energized and unenergized position	
			5) Between contact poles	
j)	Insulation resistance	7.10	Duration of electrification 2 min; points of measurements as in Group 0 (h); test condition B	500 M ohm, <i>Min</i>
k)	Operate and release time	7.11	Rated coil voltage (or current)	Operate time 20 ms, <i>Max</i>
m)	Conditioning (run in)	7.14	Rated coil voltage and current rating	—
n)	Sealing (for sealing patterns only)	Not applicable	—	—
ii)	Group 1			
a)	Solderability	7.17	Method 1	—
b)	Robustness of terminations	7.18	<i>Tensile test</i> (all types of terminals) Load : 15N <i>Bending test</i> (plug in terminals of standard base only) — The lesser of 5 or all terminals shall be tested by applying a force of 22.5N perpendicular to the axis of the pin within	There shall be no fracture, loosening of parts or any other mechanical deterioration NOTE — Bending of solder terminals and plug in ter-

		3·17 mm of the tip of the pin; Number of bends 2	minals shall not be construed as damage
c) Impact (bump)	7.19	Time of false operation not more than 10 ma	There shall be no mechanical damage or deterioration
1) Visual examination	7.4.1	—	—
d) Vibration	7.20	See (c) Group 1	—
1) Visual examination	7.4.1	—	There shall be no mechanical damage or deterioration
2) Voltage proof	7.9	See (h), Group 0	There shall be no breakdown, spark or flashover
3) Static contact resistance	7.6	See (e), Group 0	See (e) Group 0
4) Pickup and drop out voltage	7.7	—	See Table 1
e) Impact (shock)	7.21		
1) Visual examination	7.4.1	See (c) Group 1	There shall be no mechanical damage or deterioration
2) Voltage proof	7.9	See (h), Group 0	There shall be no breakdown spark or flash over
3) Static contact resistance	7.6	See (e), Group 0	See (e), Group 0
4) Pickup and drop out voltage	7.7	—	See Table 1
f) Acceleration (steady state)	7.2.2	[For severity See (4) (b)] Time of flash operation not more than 10 ms	—
1) Visual examination	7.4.1	—	There shall be no mechanical damage or deterioration
2) Sealing	Not appli- cable	—	—
g) Change of temperature	7.24	As specified, transfer time 5 min, except exposure time at tempera- ture extreme during fifth cycle shall be for 2 h each. Temperature severity as in 4	—

*Specification for relays for electronics and telecommunication equipment: Part 1 General requirements and tests
(first revision). (Continued)

TABLE 2 TEST REQUIREMENTS — *Contd*

SL No.	TEST	CLAUSe REF IN IS : 5051 (Part 1) - 1982*	TEST CONDITIONS	REQUIREMENTS
(1)	(2)	(3)	(4)	(5)
	<i>Intermediate measurements</i>		Measurement at each temperature extreme during the fifth cycle, at the end of each exposure, and, relay still in conditioning chamber the following measurements shall be made	
	1) Insulation resistance		See (j), Group 0	See (j), Group 0
	2) Pickup and drop out voltage		See (f), Group 0	See Table 1
	3) Operate and release time		See (k), Group 0	See (k), Group 0
	<i>Final measurements</i>			
	1) Visual examination	7.4.1	—	—
	2) Voltage proof	7.9	See (h), Group 0	There shall be no breakdown, spark or flashover
	h) Climatic sequence	7.25	—	—
	1) Dry heat	7.25.3	At maximum category temperature (70°C)	—
	2) Damp heat (cyclic) (first cycle)	7.25.4	1 cycle	—
	3) Cold	7.25.6 7.25.6	At minimum category temperature (—40°C)	—
	4) Low air pressure		30 kPa	—
	i) Voltage proof	7.9	See (h), Group 0 Test voltage 1/5 of the initial value	There shall be no breakdown spark or flashover
	5) Damp heat (cyclic) (remaining cycles)	7.25.7.2	—	—

i) Visual examination	7.4.1		There shall be no mechanical damage or deterioration
ii) Voltage proof	7.9	See (h), Group 0	There shall be no breakdown spark or flashover
iii) Insulation resistance	7.10	—	50 M ohm, <i>Min</i>
iv) Sealing	Not applicable	—	
iii) <i>Group 2</i>			
a) Damp heat (steady state)	7.27	—	—
1) Voltage proof	7.9	See (h), Group 0	There shall be no breakdown, spark or flashover
2) Insulation resistance	7.10	—	50 M ohm, <i>Min</i>
3) Sealing	Not applicable	—	—
4) Solderability	7.17	Method 1	—
iv) <i>Group 3</i>			
a) Overload	7.29	Current rating and rated coil voltage as in 3 and Table 1	Contacts shall be successfully make and break the applicable load(s) and case to earth fuse shall remain electrically continuous
b) Life (electrical and mechanical)	7.30	The operations and rate of cycling shall be as follows and both N_o and N_c contact point shall be loaded: a) <i>Resistive Load</i> — Cycling rate shall be 20 ± 2 operations per minute, suitable resistors shall be used, rated resistive current as in 3 for 1 000 000 operations	The relay shall remain mechanically and electrically operative and there shall be no phase to phase arcing. No failure to release. The dynamic contact resistance shall not exceed the values specified in (m), Group 0 more than once per 200 000 operations and the case to ground fuse shall remain electrically continuous

*Specification for relays for electronics and telecommunication equipment : Part 1 General requirements and tests
(first revision).

(Continued)

TABLE 2 TEST REQUIREMENTS — *Contd*

Sl No.	TEST	CLAUSe REF IN IS : 5051 (Part 1) - 1982*	TEST CONDITIONS	REQUIREMENTS
(1)	(2)	(3)	(4)	(5)
			b) <i>Inductive Load</i> — This test shall be done at a derated value of current depending on the value of inductance but in any case not exceeding 50 percent of the resistive load current. Appropriate inductive load component as given in 7.29(b)(2) shall be used. A suitable resistor may be placed in the circuit to obtain rated steady state current flow. Rate of operation shall be 10^{+1}_{-0} operations per minute with equal 'on' and 'off' time	
			c) <i>Lamp Load</i> — The load shall consist of tungsten lamps which shall be operated at their rated voltage. Rated current as in 3, shall flow when the lamps have stabilized. Cycling rate shall be 2 to 3 operations per minute with equal 'on' and 'off' time	
			d) <i>Motor Load</i> — The resistor shall be used. Resistive load current shall be 5 times the rated motor load current as in 3. Cycling rate 2 to 3 operations per minute, with equal 'on' and 'off' time	
			e) <i>Low level</i> — Relays shall be tested as follows :	

Test Circuit — Monitoring of the contact resistance of each pair of contact shall be accomplished on each cycle. A separate monitoring indicator shall be used for each contact to measure the contact resistance. Power source shall be of maximum 30 mV dc or ac peak and shall be capable of supplying 10 mA of current (see 3 also). The circuit shall be adjusted to supply 10 mA maximum current

Monitoring Apparatus — The monitoring apparatus shall be capable of indicating resistance greater than a particular value, as specified. Care should be exercised so as to minimize any loading effects by the monitoring apparatus such as current surge as a result of shunt capacitance of shield wire instrumentation current to the monitoring indicator. During each enclosure, the contact potential shall be monitored for at least 50 percent of the time contacts are closed. The apparatus shall provide and record the following information:

- 1) Number of contact closures with contact load applied
- 2) If required, number of times contacts have performed, as specified and period to the first failure to perform, as specified
- 3) Number of times the contact have failed to perform, as specified (the number of misses)

*Specification for relays for electronics and telecommunication equipment: Part 1 General requirements and tests
(first revision).

(Continued)

TABLE 2 TEST REQUIREMENTS — *Contd*

SL No.	TEST	CLAUSe REF IN IS : 5051 (Part 1)- 1982*	TEST CONDITIONS	REQUIREMENTS
(1)	(2)	(3)	(4)	(5)
			4) Sticking of contacts, when in the 'Open' condition, unless otherwise specified. Sticking of contact shall be defined as failure to reach 90 per cent of the open circuit voltage <i>Procedure</i> — Each pair of the contacts shall be operated for the number of cycles and cycling rate with the required load applied. The contact resistance shall be continuously monitored using the above apparatus The following details shall apply: i) Number of misses which will be considered as failure: one ii) Maximum contact resistance allowed as in 13.3 and 13.1 iii) Number of operation and cycling rate. Unless otherwise specified 100 000 operations at the rate of 50 to 300 cycles per minute shall be applied	
1)	Visual examination	7.4.1	—	There shall be no mechanical damage or deterioration
2)	Coil resistance	7.5	—	See Table 1
3)	Static contact resistance	7.6	See (e), Group 0	See (e), Group 0
4)	Pick up and drop out voltage	7.7	—	See Table 1

5) Operate and release time	7.11	See (k), Group 0	See (k), Group 0
6) Contact bounce	7.8	—	3 ms, <i>Max</i>
7) Voltage proof	7.9	See (h), Group 0	There shall be no breakdown, spark or flashover
8) Insulation resistance	7.10	See (j), Group 0	500 M ohm, <i>Min</i>
v) Group 4			
a) Resistance to solvents	7.31	—	—
1) Static contacts resistance	7.6	See (e), Group 0	See (e), Group 0
2) Voltage proof	7.9	See (h), Group 0	There shall be no breakdown, spark or flashover
3) Insulation resistance	7.10	See (j), Group 0	500 M ohm, <i>Min</i>
b) Resistance to soldering heat	7.32	—	—
1) Visual examination	7.4.1	—	There shall be no mechanical damage or deterioration
2) Contact resistance	7.6	See (e), Group 0	See (e), Group 0
3) Insulation resistance	7.10	See (j), Group 0	500 M ohm, <i>Min</i>
4) Pickup and drop-out voltage	7.7	—	See Table 1
5) Coil resistance	7.5	—	See Table 1
vi) Group 5			
a) Magnetic interference	7.33	—	—

*Specification for relays for electronics and telecommunication equipment: part 1 General requirements and tests (first revision).

(Continued)

TABLE 2 TEST REQUIREMENTS — *Contd*

SL No.	TEST	CLAUSe REF IN IS : 5051 (Part 1) - 1982	TEST CONDITIONS	REQUIREMENTS
(1)	(2)	(3)	(4)	(5)
	1) Pickup and drop out voltage	7.7	—	See Table 1
	2) Coil life	7.34	—	—
	<i>Intermediate measurements</i>			
	1) Operate and release time	7.11	See (k), Group 0	See (k) Group 0
	2) Coil resistance	7.5	See (d), Group 0	See Table 1
	3) Static contact resistance	7.6	See (e), Group 0	See (e), Group 0
	4) Pick up and drop out voltage	7.7	—	See Table 1
	<i>Final measurements</i>			
	1) Visual examination	7.4.1	—	There shall be no mechanical damage or deterioration
	2) Operate and release time	7.11	See (k), Group 0	See (k), Group 0
	3) Contact bounce	7.8	—	3 ms, <i>Max</i>
	4) Static contact resistance	7.6	See (e), Group 0	See (e), Group 0
	5) Coil resistance	7.5	See (d), Group 0	See (d), Table 1
	6) Voltage proof	7.9	See (h), Group 0	There shall be no break-down spark or flashover
	7) Insulation resistance	7.10	See (j), Group 0	500 M ohm, <i>Min</i>
vii)	<i>Group 6</i>			
	Minimum current (intermediate current)	7.36	Operation level 2	—
viii)	<i>Group 7</i>			
	Mould growth	7.28	—	—



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